UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

V2

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,234	01/20/2004	Haomin Jin	1213.43404X00	7207

20457 7590 02/15/2008

ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-3873

EXAMINER
AMINI, JAVID A

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
02/15/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/759,234	JIN ET AL.	
	Examiner	Art Unit	
	Javid A. Amini	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/31/2007 has been entered.

Response to Arguments

Applicant's arguments, see remarks, pages 12-13, filed 10/31/2007, with respect to the rejection(s) of claim(s) 1-20 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Noronha, S.; Nevatia, R.

Applicant on pages 12-13 argues that the Marc and Suyoung do not use a single image including gray-level.

The cited reference Noronha teaches the deficiencies of what Marc and Suyoung presented in view of Applicant, See the rejections, below.

Examiner's questions: Applicant may consider emphasizing the specification of the single image (i.e. 2D or 3D image), see following questions: Is there a camera/device taking an image/images from a single image? Is the single image a 2D image or 3D image? Is there a camera/device taking images of a single image from different angles? Is a single image black/white or color?

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 12, the preamble recited "a computer program embodied in a computer readable media.." the computer program is not clearly defined in the specification as to whether the computer program is stored in a computer readable medium or a computer readable medium storing/embodied with a computer program, also the nature of terms "media" and "product" are not clearly defined, on the other hand, in claims 13-18 recite the limitation "the computer product" in preambles. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suyoung Seo and Toni F. Schenk with title of "A study of integration methods of aerial imagery and LIDAR data for a high level of automation in 3D building reconstruction" dated April 2003, hereinafter

Suyoung, and in view of Marc Pollefeys, Luc Van Gool with title of "How the virtual inspires the real: From images to 3D models", hereinafter **Marc**, and further in view of Noronha, S.; Nevatia, R.; **Detection and modeling of buildings from multiple aerial images** Pattern Analysis and Machine Intelligence, IEEE Transactions on Volume 23, Issue 5, May 2001 Page(s):501 – 518, hereinafter Noronha.

Claim 1

Suyoung teaches a map generation device (see figs. 13-17), comprising: Suyoung teaches an image appointment unit (i.e. noted in fig. 13) that receives user appointment of at least one position in a building existing (i.e. noted in fig. 17) within a single image including information about a gray-level to designate the at least one position as part of a building region; Suyoung teaches a polygon extraction unit (noted on page 71 section 6.1, see figs. 7-8) that extracts at least one pixel from pixels (i.e. noted on page 69 section 4.2),

Suyoung is silenced about the building region based on a result of discriminating a color of the pixels around the building region to compare whether the pixels are within a gray-level variance of a predetermined discrimination threshold, sets the building region to include extracted pixels as a portion of an extracted building region, and repeats the extract and set operations to expand the extracted building region with more extracted pixels, and then extracts a polygon line of the extracted building region as vector information; and

However, Marc teaches on page 53 the building region based on a result of discriminating a color of the pixels around the building region to compare whether the pixels are within a gray-level variance of a predetermined discrimination threshold, sets the building region

to include extracted pixels as a portion of an extracted building region, and repeats the extract and set operations to expand the extracted building region with more extracted pixels, and then extracts a polygon line of the extracted building region (i.e. noted under "robustly relating real images"); Suyoung teaches a structural analysis and integration unit that detect a boundary of the building region and lines inside the building region, and compares between a shape of detected lines and a predetermined share pattern of cross lines (i.e. noted in fig. 17 initial approximation and estimation and the final result, also on page 71 figs. 5-8 illustrate predetermined shape pattern);

Suyoung obviously teaches wherein the structural analysis and integration unit estimates the building region based on the compared shape of the detected lines in a case where the lines inside the building region correspond to any predetermined integration patterns, and terminates a process for integrating the building structure in a case where there exist no lines corresponding to any of the integration patterns, and wherein the polygon extraction unit generates a vector of the polygon line of the extracted building region as vector information estimated by the structural analysis and integration unit (i.e. noted in fig. 17 initial approximation and estimation and the final result, also on page 71 figs. 5-8 illustrate predetermined shape pattern).

Suyoung and Marc do not explicitly specify within a single image including information about a gray-level to designate the at least one position as part of a building region.

However, Noronha teaches on page 505 under section 3.2 two methods are used for computing a flat-roof: one that uses information from multiple images directly and another that uses information from **a single image only**, see section 3.2.2. on the other hand Noronha uses gray-level to estimate the flat-roof, see fig. 1 on page 502.

Thus, it would have been obvious to a person skill in the art at the time of the invention to combine Noronha's method of single image into Marc and Suyoung method/system, because Noronha 's method/system detects rectilinear buildings with flat or symmetric gable roofs from multiple intensity images, it would be common for many systems to use the hypothesize and verify approach to object detection and modeling. Also the combination of Marc and Suyoung provide a depth estimate, or the distance from the camera to the object surface, for almost every pixel in an image. The images used for the reconstruction can also be used for texture mapping, thus achieving a final photo realistic result.

Claim 2

Suyoung is silenced about comprising a roof texture analysis unit that analyzes colors around the at least one position to determine sample colors for discriminating, the discrimination threshold, and a region searching range, wherein the polygon extraction unit extracts at least one of the pixels to be included in the building region based on a result of discriminating a similarity between a color of the pixels in the region searching range and the sample colors for discriminating. However, Marc on page 53 teaches comprising a roof texture analysis unit that analyzes colors around the at least one position to determine sample colors for discriminating, the discrimination threshold, and a region searching range, wherein the polygon extraction unit extracts at least one of the pixels to be included in the building region based on a result of discriminating a similarity between a color of the pixels in the region searching range and the sample colors for discriminating (i.e. noted under "robustly relating real images").

Thus, it would have been obvious to a person skill in the art at the time of the invention to combine Marc into Suyoung in order to obtain a depth estimate, or the distance from the camera

to the object surface, for almost every pixel in an image. The images used for the reconstruction can also be used for texture mapping, thus achieving a final photo realistic result.

Claim 3

Claim 3 is rejected with a similar reason set forth in claim 2, above.

Claim 4

Claim 4 is rejected with a similar reason set forth in claim 2, above. Note: Marc on page 53 discloses that the most challenging issue involves automatically getting initial matches from real images. For the computer, an image is just a large collection of pixel intensity values. To find corresponding points in different images, an algorithm might compare intensity values over a small region around a point. However, not all points are suitable for such comparison. When a point cannot be differentiated from its neighbors, it is also not possible to find a unique match with a point in another image. Therefore, points in homogeneous regions or located on straight edges are not suitable for matching at this stage. The typical approach to selecting interesting points uses a feature detector [4] that looks for maximal dissimilarity with neighboring pixels; we typically aim to extract 1,000 feature points per image, well distributed over the entire image.

Claim 5

Suyoung teaches wherein the polygon extraction unit extracts pixels largely different in color from adjacent pixels as edge pixels, determines boundary lines based on the edge pixels, and expands the extracted building region to the boundary lines to correct the extracted building region (i.e. noted on page 71, section 6.1 by linking edge pixels to edge entities).

Claim 6

Suyoung teaches wherein the polygon extraction unit rotates the extracted building region so as to set the polygon line of the extracted building region in a predetermined axis direction, and smoothes the polygon line (i.e. noted on page 66 section 3).

Claim 7

Suyoung teaches comprising a polygon correction unit that, in a case where the polygon line extracted by the polygon extraction unit corresponds to a predetermined linking pattern, corrects the polygon line to one of a straight line and lines crossing each other at a predetermined angle (i.e. noted in figs. 13-17, see also on page 69 section 4.2 the average angle).

Claim 8

Claim 8 is rejected with a similar reason set forth in claim 7, above. (i.e. noted in figs. 13-17)

Claim 9

Suyoung teaches wherein the structural analysis and integration unit integrates the building region at least once by a plurality of inputted positions (i.e. noted in section 6).

Claim 10

Suyoung teaches comprising a ground projection unit that, in a case where the aerial photograph shows a building obliquely, corrects distortion due to a height of the building, and projects a building polygon shape on a ground (i.e. noted as an input data using LIDAR), see claim 1 rejection for the amend part of the claim, i.e. "single image".

Claim 11

Suyoung teaches a map delivery method, which is used to deliver a map by associating the map created by the map generation device according to claim 1 with the aerial photograph (i.e. noted

in figs. 13-17, also see the abstract), see claim 1 rejection for the amend part of the claim, i.e. "single image".

Claims 12, 19

Claims 12, 19 are rejected with a similar reason set forth in claim 1, above.

Claim 13

Claim 13 is rejected with a similar reason set forth in claim 2, above.

Claim 14, 16

Claims 14, 16 are rejected with similar reasons set forth in claims 3 and 7, above.

Claim 15

Claim 15 is rejected with a similar reason set forth in claim 6, above.

Claim 17

Claim 17 is rejected with a similar reason set forth in claim 8, above.

Claim 18

Claim 18 is rejected with a similar reason set forth in claim 10, above. (i.e. noted in figs. 13-17).

Claim 20

Suyoung teaches on page 66 section 2.2 teaches the verification process that is implemented by estimating the parameters of the building models, and to increase the robustness, multiple resources from aerial images and LINDAR data are incorporated.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Javid A. Amini whose telephone number is 571-272-7654. The examiner can normally be reached on 8-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on 571-272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Javid A Amini
Examiner
Art Unit 2628

J.A.